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Contents

Chapter 1

intro

Chapter 2

CTD(SBE 911plus)

2.1

SBE 911plus CTD Sea-Bird Electronics , WOCE(World Ocean Circulation Experiments) (Kim et al,2000). SBE 9plus underwater unit (main housing, pump and sensors) CTD , , SBE 11 deck unit . , deck unit water sampler button , . 24 . SBE 9plus 1 1 .

SBE 5T SBE 5P (30 /s) 0.4 T-C duct . CTD . T-C duct duct 0.073 conductivity cell . (0.073) , SBE 11plus Deck Unit .

2.2

2.2.1

2.2.1.1

(resistance) , thermistor (, signal) . , / / , / thermistor / . time constant(step change , 63%) 70ms(0.070) . SBE9plus underwater unit 24Hz, 0.0417 . Sea bird . Data processing Alignctd .

2.2.1.2

2 cm3 , 30 /s 67ms .
time constant 24ms(0.024s) .
. , , .
. SBE11plus deck unit 0.073
, primary +1.75scans(24Hz 1.75/24=0.073 seconds) factory-set
, thermocline (-0.08 ~0.08) .
. aligctd .

2.2.1.3

(piezoresistive effect) .
. 50 .
,
. SBE 9plus Paroscientific Digiquartz .
, .

2.2.1.4

SBE 43 membrane , electrode Teflon membrane electrode electrolyte . electrode ,
. 20℃ time constant( ) 2 , sensor membrane age .

2.2.2

SBE 9plus SBE 32 Carousel Water Sampler .
(horizontal mount) (vertical mount) ,
.

2.2.2.1 vertical mount

13 mm, 19 mm Tygon (Tygon tubing) . .
. DO 13 mm 9.5 mm Tygon tubing Tygon tubing(13 mm) . DO conductivity cell Y-fitting .

2.2.2.2 horizontal mount

13 mm, 19 mm Tygon tubing . DO conductivity .
DO . . DO 13 mm 9.5 mm Tygon tubing Tygon tubing(13 mm) . DO conductivity cell .

2.2.3

2.2.3.1 bottom end cap

SBE 9plus bottom end cap pressure port connector 6 (4). pressure port primary temperature primary conductivity connecto(JB1, JB2), connector(JB3), secondary temperature secondary conductivity connector(JB4, JB5) , SBE bottom contact switch connector(JB6) . temperature conductivity pin 3 (3-pin) , 3-pin cable(; 17086, 6) bottom end cap connector(JB1, JB2, JB4, JB5) . JB3 2-pin cable(; 17133, 7) , 2 Y-cable(; 17799, 8) .

2.2.3.2 top end cap

SBE 9plus top end cap 2-pin connector(JT1), 3-pin connector(JT4) 5 6-pin connector(JT2. JT3, JT5, JT6, JT7) (5). 2-pin connector sea cable(; 17027, 17028, 17136 , 9) cable JT2, JT3, JT5, JT6 connector . DO (SBE43) 6-pin-4-pin cable(; 171491, 10) . SBE32 Carousel water sampler JT7 connector 6-pin-6-pin cable(; 17198, 11) , General Oceanics Rosette water sampler JT4 3-pin-3-pin cable(; 17196, 17533 , normal polarity, reverse polarity) . ※ SBE 9plus 2-pin connector 3 (JT1, JB3, JB6) JT1 sea cable JB6 CTD 2007 2 SBE 9plus JB6 (female) . JB3 sea cable JT1 (male) 2-pin connector .

2.3

2.3.1 SEASAVE

seasave CTD , GPS , CTD , display . seasave setup program setup file (*.psa) (12).

2.3.1.1 (Instrument Configuration) : seasave > configure inputs

configuration file , post-calibration .

seasave , configuration inputs Instrument configuration (3-1), (Open) (Create) (*.con), 'Modify' . 'Create' , '911/917plus CTD' , "Frequency channels suppressed" 0,1,2 (3-2). Frequency . T, C single/dual , dual T, C 0 , dual T & single C 1 , single T, C 2 . T, C frequency (voltage) T, C . "Voltage words suppressed" 0~4 (3-2), CTD underwater unit (DO, fluorometer, altimeter, nitrate sensor, turbidity-meter) .

JT2(V0, V1), JT3(V2, V3), JT5(V4, V5), JT6(V6, V7) 8 (2 Voltage . voltage) (3-3), voltage Voltage words suppressed . , JT6 altimeter V6 , 0 Voltage 7 . 0 voltage 7 , 1 voltage 5 , 2 voltage 3 , 3 voltage 1 , 4 . 4 .

"Computer interface" IEEE-448 RS-232 . Deck unit computer RS-232 .

"Scans to average" . CTD full data 1 , 24Hz SBE911 CTD 24 , 1 1 .

"Surface PAR voltage added" underwater unit PAR Surface PAR . Application Note 11s .

"NMEA position data added" NMEA , NMEA . Pressure (m) , configuration inputs "Miscellaneous" .

"Scan time added" data scan (GMT 1970 1 1) . . , Free calibration sheet . , . 3-1 voltage .

, Save save as . ( ) .

2.3.1.2 'Serial Ports'

. Deck unit computer 3-6 deck unit (4) SBE11 interface (RS-232) (7) MODEM CHANNEL(water sampler) Deck unit (3-7) 1 . 9pin 2~3 USB , 9pin USB USB . deck unit (3) . CTD Deck unit underwater unit (8) , NMEA (10) .

, port (3-8). "CTD Serial port" deck unit (4) com port , Baud rate(9600 19200), data bits (8), parity (None) . "Water sampling port" deck unit (7) com port . "Serial Data Output data port" "Output data to serial port" . "SBE14 Remote display Serial Port" "Send data to SBE14 remote display" . water sampler . "Water sampler type" SBE carosel , "Number of Water Bottles" Niskin bottle Carosel water sampler trigger part (3-10) Bottle trigger . , bottle 6 , trigger 12 12 . "Firing sequence" sequential/User input , Sequential bottle firing , User input firing . "Enable remote firing" TCP/IP port computer firing . .

Seasave window display (depth, average sound velocity, descent rate, acceleration, oxygen, plume anomaly, and potential temperature anomaly) , . "Latitude when NMEA is not available" NMEA navigation Seasave pressure depth depth . NMEA .

'OK' configuration file .

2.3.1.3 Water Sampler

Configure Inputs Water Sampler (20). Water sampler type SBE Carousel . Number of Water Bottles carousel bottle (24 carousel 20 bottle 24). Firing sequence User Input (Sequential firing bottle firing)

2.3.1.4

Configure Outputs SBE11plus Alarms (21). altimeter Enable altimeter alarm . Alarm set point(meters) altimeter .

2.3.1.5 (Display)

Window display sea-save . 4-1 Fixed, Scrolled, Plot display , . 24Hz 8Hz ( ) . , 1 , 1 display , 0 .

Fixed display
Fixed display (4-1 4-2) Scan number, Pressure(db), Depth(salt water, m), Temperature (ITS-90), Potential temperature(ITS-90), Salinity, Dissolved oxygen(ml/l mol/kg), altimeter , pump . Fixed display 'Modify' . 'Modify' (pump on/off), , , Font size small/medium/large , 'Add' ( ), 'Insert'( ), 'Change'( )' . 'Delete' . "Seconds between updates" Fixed display . . 0 , 1 1 . 0 . Fixed display 'Export display setting' .

Scrolled display
Scrolled display Fixed display vertical column (4-3). Fixed display . Scrolled display 'Modify' . "Rows to display" (row) (40) , 'Total rows' (200) . Rows to display< Total rows scroll bar , Rows to display= Total rows scroll bar . Altimeter . "Seconds between updates" '0' .

Plot display
Plot display plot 5 (1 Y 4 X 1 X 4 Y) display . ( ) . 'Plot Setup' (4-4). "Number of seconds between plot updates" (0 plot), "Plot type" Single X-Multi Y Single Y-Multi X( ) , "Number of Axies" plot 2~ 5 , "Title" plot title . "Font size" plot small/medium/large . "Enable upcast line colors" downcasting upcasting . . , "Minimum pressure to determine upcast" "Pressure decrease to determine upcast" . Minimum pressure to determine upcast pressure pressure , pressure pressure "Pressure decrease to determine upcast" upcast . "Minimum

~" 300 , "Pressure ~" 30 , CTD 300 dbar , pressure 310 dbar 280 dbar upcast line ."Bottle display" "Show bottle lines" plot firing bottle number line . "Show fire sequence" plot bottle . "Mark line display" . "Configure outputs" "Mark variables" , "Mark scan control" . "Mark scan control" "Mark scan" Mark line *.mrk . "Redraw buffer size" buffer scan , "Queue size limit" queue scan , Sea-bird 4000, 10 . "Grid line use" plot grid (Horizontal and Vertical), "Grid line style" plot grid line style (dotted Line) , plotting data grid "Grid in front" . 'Y-Axis' . 'X-Axis 1' potential temperature 4-5 . "Auto page this axis" , . plot depth . 2500m , plot display Y-Axis depth Auto page depth 0~500 , X-Axis descent rate altimeter , 500m descent rate(CTD .), altimeter data( ) . 4-6 plot . , .

Bottle firing display
Bottle firing control , . . "Fire button" Bottle firing . firing .

Bottle firing bottle firing , .
Bottle firing Deck unit "Water sampler control"
LED on/off 5 bottle firing .

2.3.2

SBE 9plus (profiling rate) 0.5 2 m/s . (data quality) (profile resolution) 1 m/s . CTD (sea state) . turbulent wake CTD . CTD (; 10 20 cm/s) . CTD T-C duct downcast data upcast data . T-C duct . CTD CTD CTD (3 4) (soak) . CTD . winch wire CTD kink carousel CTD drag kink . 100 200 kg( ) drag .

2.3.3

configuration file , .
"Data Archiving Options" Begin archiving data immediately ( ), Begin archiving data when 'Start Archiving' command is sent (Real-time Date Start-Archiving), Do not archive data for this cast (real-time display) . (3-12) "Output data [.HEX] file" . Do not archive data for this

cast .
"Configuration Options" configuration . Configuration input
. .
"Timeout in seconds at startup" scan data ( ) , data
. 'Start' waiting display (
3-13) computer deck unit underwater unit ,
error . 10 .
"Timeout in seconds between scans" scan scan gap
( ) , scan seasave . 10 .
'Start' . "Header information" display , 'Ok'
. '*.hdr' . "Header information"

"Don't include Header information in file" . "Header information"
format

. "Data Archiving Options" Begin archiving data when 'Start Archiving' command is sent .

: 'Start' Deck unit power on , deck 'Stop'
Deck unit power off . 'Stop' Deck unit
.

window display . "Data Archiving Options"
Begin archiving data when 'Start Archiving' command is sent ,
display . "Data Archiving Options"
Begin archiving data immediately .
, , Deck unit power off . .hex .dat .
Rawdata SBE911plus CTD Seasave 6.0 .dat
(SBE911plus CTD CTD SBE911plus CTD Seasave 7.0)
.hex .

2.3.4

- CTD (44).
- 0.1% Triton X-100 T-C duct inlet 0.1% Triton X-100
  Conductivity cell (45). (※ 0.1% Triton X-100 DO
  drift . DO 0.1% Triton X-100
  cast DO 0.1% Triton X-100 . DO
  conductivity cell conductivity cell (Tyhon tube, 46 A)
  0.1% Triton X-100 (flush) cast .
  0.1% Triton X-100 DO 0.1% Triton X-100 conductivity cell
  DO (A) flushing .)
- (Fi.g 46 B) DO conductivity cell .(※ conductivity
  cell cell CTD .)
- 500-100 ppm Tygon conductivity
  cell (47). ( ) T-C duct
  cell (34). (※ (
) cell Tygon .)